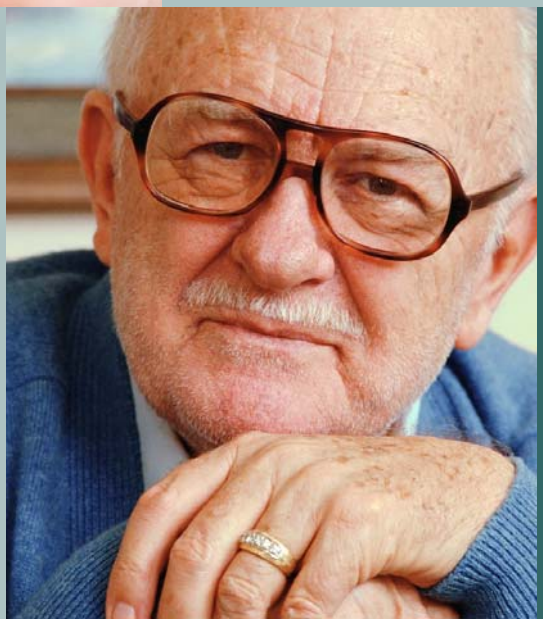
The Burden of Asthma in Montana

Challenges and opportunities related to asthma management and control in the Big Sky state



Executive Summary

Asthma exacts a significant disease burden in Montana.

- 8.3% of adults aged 18 and over and 11.1% of Montana high school students report currently having asthma.

Asthma disparities exist, with some groups shouldering a higher disease burden than others.

- Females adults have significantly higher prevalence of asthma than males (9.7% vs. 6.8% in 2006). Obese adults also have a higher prevalence of asthma than adults who are not obese (11.5% vs. 7.3% in 2006).
- Other factors independently associated with higher asthma prevalence in Montana adults include lower annual household income and less educational attainment.
- High school youth who are overweight have significantly higher prevalence of asthma than their counterparts who are not at risk for overweight (15.2% vs. 10.2% in 2007).
- Among children aged 0-18 enrolled in the Montana Medicaid program, males, children aged 0-4 and American Indians seek asthma related healthcare at higher rates than females, children aged 5 to 18 and whites.

Asthma is a serious health condition, leading to hospitalization and sometimes death.

- In 2005, over 700 hospitalizations with a primary diagnosis of asthma and 4200 hospitalizations with a secondary diagnosis of asthma occurred in Montana. Hospitalization rates are highest for children aged 0-4 and adults aged 65 and over and have increased 32% and 46% in these groups respectively from 2000 to 2005.
- Since 1990, an average of 20 deaths due to asthma have occurred annually in Montana. Death rates due to asthma are declining, dropping 60% overall from 1990 to 2005.

Asthma is a prevalent and costly illness for Montana children. Opportunities exist to improve asthma control and prevent costly exacerbations.

- Of the children continuously enrolled in Montana Medicaid from 2005-2006, 2019 (8.8%) utilized asthma related healthcare. From January 2005-December 2006, these children had 5710 outpatient visits, 997 ED visits and 129 hospitalizations for asthma billed to Medicaid resulting in $989,000 in medical claims.
- Only 53% of the children with asthma on Medicaid had a routine exam during 2005 or 2006 and only 33% received a flu vaccine, despite CDC recommendations that all children with asthma be vaccinated annually.
- One in five children with asthma on Medicaid (19%) had an asthma related hospitalization or ED visit from 2005-2006; 14% had 2 or more ED visits for asthma.
- Children with 2 or more asthma related ED visits had less than optimal medication regimens, averaging 6.5 quick relief asthma medications filled compared to 3.6 per child who did not visit the ED.

More can be done to monitor asthma and intervene to promote asthma control.

- In Montana, surveillance must be developed to measure asthma related ED visits, adherence to clinical guidelines, asthma management and control, and the effect that asthma has on the daily lives of those with the disease. The Asthma Call-Back Survey, implemented in 2006, provides an opportunity to significantly improve our understanding of asthma in Montana.
- The Montana Asthma Control Program will use surveillance data, in conjunction with key stakeholders, to inform the development of a comprehensive asthma control plan. The plan will support evidence based public health interventions and program evaluation related to asthma in multiple settings across the state.

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Asthma in Focus

Asthma is a chronic inflammatory disease of the airways characterized by episodic symptoms of wheezing, shortness of breath, coughing and chest tightness. The prevalence of asthma in the US has more than doubled over the past three decades from an estimated 3.1% in 1980 to 7.1% in 2004.[1] Approximately 22 million people in the US currently have asthma. In 2004, asthma was responsible for nearly 500,000 hospitalizations, 2 million emergency department (ED) visits and 5000 deaths nationwide and the economic burden of the disease totaled more than $16 billion.[2]

Though asthma impacts individuals across the lifespan, a higher percentage of children suffer from the disease than adults. Asthma is the most common chronic disease among children in the US, affecting 8.5% of children under the age of 18, a total of more than 6 million individuals. [1]

Asthma prevalence rates in Montana are similar to national rates; 8.3% of Montana adults and 8.5% of adults nationwide report that they currently have asthma.[3] High school youth in Montana report rates of lifetime asthma that are slightly higher than national rates (18.9 vs 17.1%, p=.04) and current asthma rates that are not significantly different than national rates (15.8 vs. 14.5%, p=.12).[4] In all, an estimated 75,000 Montanans currently have the disease.

Because asthma is a serious public health concern, the Centers for Disease Control and Prevention (CDC) has made the control and management of asthma a national priority, including 8 asthma related objectives in the Healthy People 2010 framework. The Montana Department of Public Health and Human Services (DPHHS) supports these objectives and is committed to comprehensively addressing asthma in Montana. In 2007, the Montana state legislature provided funding for asthma control, allowing DPHHS to create an Asthma Control Program. This program is responsible for developing an asthma surveillance system for the state and for coordinating a statewide asthma control effort.

This burden report is the Asthma Control Program's first attempt to systematically compile existing data related to asthma in Montana. Data sources used in this report include:

- Behavioral Risk Factor Surveillance System (BRFSS)
- Youth Risk Behavior Survey (YRBS)
- Hospital discharge data
- Mortality data
- Pediatric Medicaid data

The report also details areas in which surveillance can be improved to gather more robust data related to asthma in Montana.

This burden report will be used by the Asthma Control Program, in concert with stakeholders from around Montana, to inform the development of a statewide asthma control plan. The plan will promote healthcare consistent with evidence based guidelines, empower patients to self-manage their disease, reduce and control environmental triggers, implement asthma education in schools and childcare facilities, promote community involvement and develop asthma policy. All of these efforts will be aimed at accomplishing the overall goal of the Asthma Control Program– to improve the quality of life of all Montanans with asthma.

MONTANA
ASTHMA CONTROL PROGRAM

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Montana in Focus

To address asthma issues in Montana it is important to understand the state's unique characteristics including:

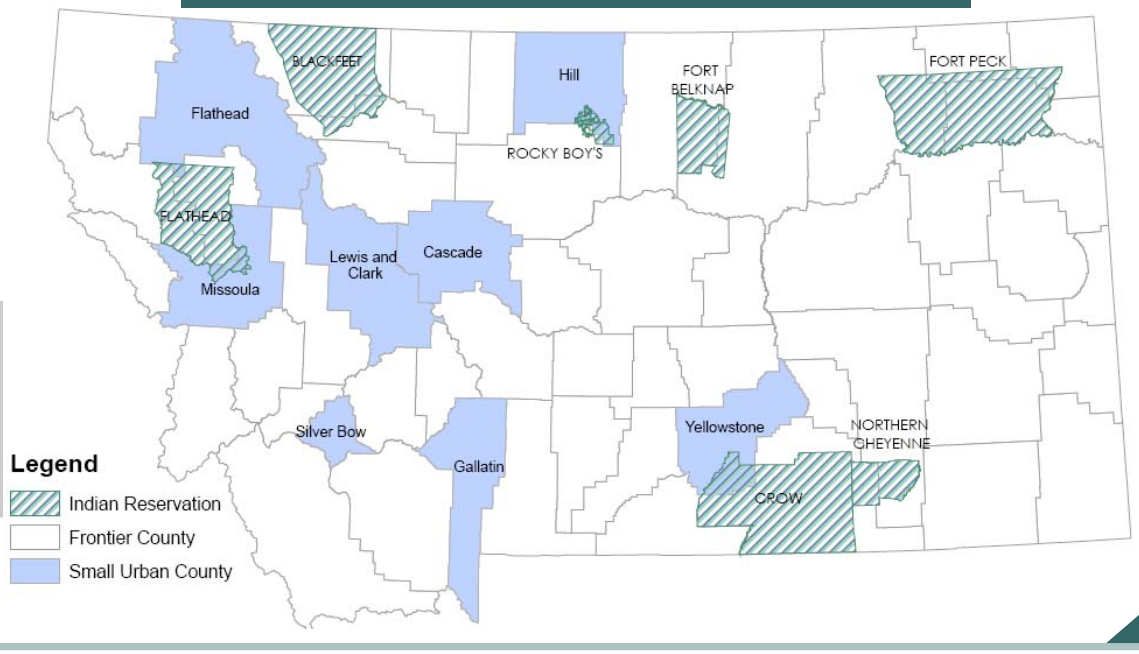
- Rural demographics: Though Montana is a large state in terms of land area it has a total population of 944,632 and a population density of only 6.4 persons per square mile.[5]
- Frontier Counties: 48 of Montana's 56 counties are classified as frontier counties meaning that they are without a city of 10,000 or more. The population of these counties ranges from 470 to 39,940.[6]
- Small Urban Counties: 8 counties in Montana are classified as small urban counties, and 62% of Montana's population lives in one of these counties. The population of these counties ranges from 16,304 to 136,691.[6]
- Indian Reservations: Montana has 7 Indian reservations and 12 different tribes represented in the state. Each reservation has a sovereign tribal government. American Indians comprise 6% of Montana's population and are the state's largest minority group.[5]

Because of Montana's unique blend of Indian tribal areas, small urban cities and vast frontiers (Figure 1), an effective asthma control plan in the state will require a diverse approach that considers the needs and opportunities for intervention in each area of the state.

Other Factors Related to Asthma in Montana

- Household income: Asthma disproportionately affects persons of low income. Montana's median household income is almost 15% less than the median income for the US as a whole ($40,627 vs. $48,451 in 2006). The median household income for American Indians in Montana is $21,406 compared to $41,604 for whites.[5]
- Health insurance: Adequate insurance coverage is imperative for individuals with asthma as it is a chronic disease that affects individuals throughout the lifecourse. In 2005, 22% of Montanans reported having no health insurance coverage, higher than the national rate of 15%.[3]
- Obesity and overweight: Individuals who are overweight or obese have higher rates of asthma than persons who are not overweight or obese. Though Montana has a slightly lower prevalence than the nation as a whole, over half of Montana's adults (59%) are overweight or obese. [3]
- Smoking: Exposure to tobacco smoke and personal use of tobacco can exacerbate asthma symptoms and trigger asthma attacks. 19% of adults in Montana are current smokers, so large numbers of individuals with asthma are either smokers themselves or are regularly exposed to environmental tobacco smoke.[3]
- Environmental considerations: As a rural state, Montana does not have many of the air quality concerns that confront urban areas. However, the state does have a significant number of wildfires, with more than 2000 fires reported annually in 2000 and 2003.[7] Wildfires can produce large amounts of particulate matter known to exacerbate asthma symptoms.

Figure 1: Indian reservations and small urban counties in Montana [6]



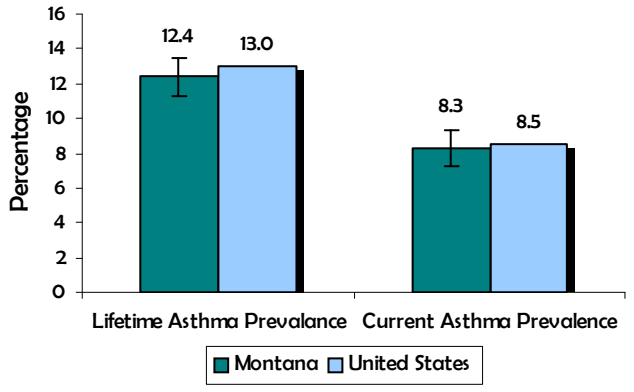
Prevalence of Asthma in Montana Adults

Every year, Montana conducts a telephone survey called the Behavioral Risk Factor Surveillance System (BRFSS), asking adults in the state about health related behaviors and conditions. The BRFSS is part of a national effort to track population level health trends. BRFSS data are used to estimate lifetime and current asthma prevalence for Montana adults.

Lifetime Prevalence

In 2006, 12.4% (95% CI 11.3-13.5) of Montana adults reported ever being told by a health professional that they had asthma. The prevalence of lifetime asthma nationally was 13.0%. (Figure 2)

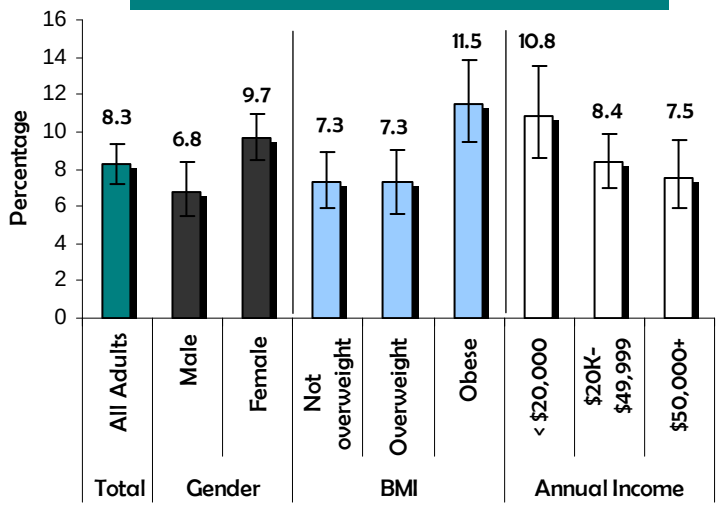
Figure 2. Lifetime and current asthma prevalence for the US and Montana, 2006



Current Asthma Prevalence

8.3% (95% CI 7.4-9.3) of Montana adults reported currently having asthma in 2006, similar to the national rate of 8.5%. (Figure 2)

Figure 3. Asthma prevalence in Montana adults by gender, BMI and annual income, 2006



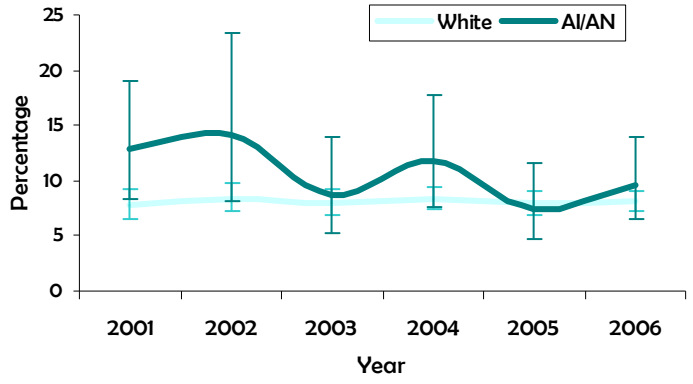
Populations at Risk

In 2006, females in Montana had significantly higher asthma prevalence than males (9.7% vs. 6.8%). Obese individuals (Body Mass Index, or BMI, ≥ 30) were also significantly more likely to have asthma than individuals who were not obese (BMI < 30) at 11.5% vs. 7.3% respectively. (Figure 3)

Other demographic factors including race, educational attainment, income and smoking status did not have a statistically significant effect on asthma prevalence for Montana adults in 2006. American Indians had an asthma prevalence of 9.6% (95% CI 6.6-13.9) vs. 8.1% (95% CI 7.1-9.1) for whites. Adults with an annual household income of <$20,000 had an asthma prevalence of 10.8% (95% CI 8.6-13.5) vs. 7.5% (95% CI 5.9-9.6) for persons with an annual household income of $50,000 or more. (Figure 3) The asthma prevalence for persons with less than a high school education was 9.9% (95% CI 6.8-14.3) vs. 8.1% (95% CI 7.2-9.2) for persons with a high school education or greater. Finally, 9.5% (95%CI 6.9-12.8) of smokers reported current asthma while non-smokers reported a prevalence of 7.9% (95% CI 7.0-8.9).

20% of adults with asthma in Montana are smokers and 64% are overweight or obese.

Figure 4. Prevalence of current asthma in Montana, 2001-2006, by race



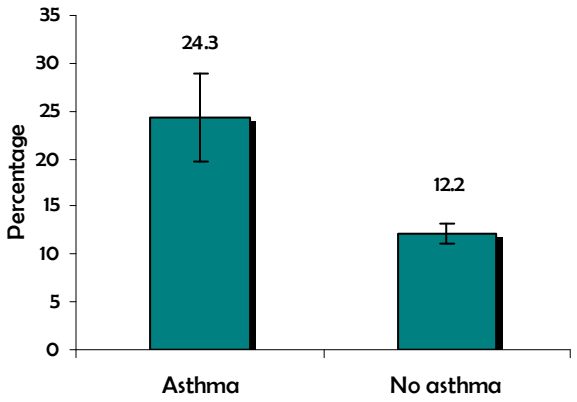
Asthma & American Indians

Annual prevalence estimates for American Indians in Montana from 2001-2006 indicate that they may shoulder a higher asthma burden than whites, but the confidence intervals for these estimates are large and overlap estimates for whites. (Figure 4) From 2001-2006 American Indians had an overall asthma prevalence of 10.5% (95% CI 8.1-12.6) compared to 8.1% (95% CI 7.7-8.6) for whites. However, after controlling for other factors such as age, education, and income, American Indian race was not independently associated with increased asthma prevalence during this period. (Table 1)

Asthma & Self-rated Health

Asthma has a significant effect on individuals' perceptions of their own health. In 2006, almost a quarter of adults with asthma in Montana rated their health as fair or poor (24.3%) compared to 12.2% of adults who did not have the disease. (Figure 5)

Figure 5. Self reported fair or poor health among adults with and without asthma, 2006



Factors Independently Associated with Asthma

To identify factors independently associated with current asthma, multiple logistic regression analysis was performed using BRFSS data from 2001 to 2006. In this analysis, if an odds ratios is greater than one and its 95% confidence interval does not overlap 1.00, it indicates that, after controlling for other demographic factors, the odds of having asthma in the group in question are significantly higher than in the referent group. For instance, based on adjusted odds ratio of 1.50, women in Montana have 50% greater odds of having asthma than men, after controlling for income, education, BMI and other characteristics. (Table 1)

In all, four factors were independently associated with increased asthma prevalence: female gender, obesity, lower household income and lower educational attainment. (Table 1) Race, health insurance status, age, and smoking were not independently associated with current asthma.

Table 1. Factors independently associated with current asthma in adults, Montana, 2001 to 2006

Demographic Characteristic	Adjusted Odds Ratio (95% CI)
Referent group*	1.00
Obese	1.64 (1.41-1.90)
Annual household income <$15K	1.63 (1.35-2.03)
Annual household income $15K-24,999K	1.40 (1.11-1.78)
Sex (female)	1.50 (1.32-1.72)
< High school education	1.28 (1.03-1.58)
American Indian race	1.05 (0.83-1.33)
No Health insurance	1.04 (0.83-1.16)
Age 18-44	1.07 (0.90-1.27)
Age 45-64	0.99 (0.83-1.17)
Current smoker	0.98 (0.83-1.16)

*Referent groups: Not overweight or obese, annual household income greater than $50,000, males, 12+ years of education, white race, with health insurance, aged 65 years and older and non-smokers.

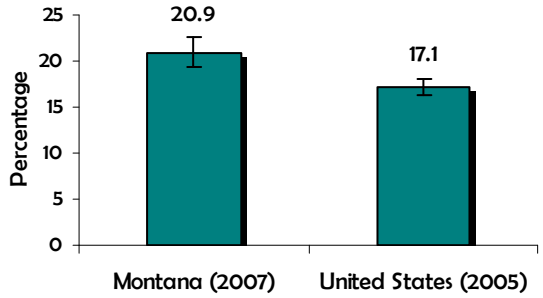
Prevalence of Asthma in Montana Youth

The Youth Risk Behavior Survey (YRBS) is a bi-annual survey used to monitor health risk behaviors in high school youth. Since 2005, the survey has measured lifetime and current asthma. YRBS data are used to estimate the prevalence of asthma in Montana youth in grades 9-12.

Lifetime Prevalence

In 2005, high school youth in Montana reported lifetime asthma prevalence rates that were slightly higher than national rates (18.9 vs. 17.1%, p=.04) In 2007, 20.9% (95% CI 19.3-22.6) of Montana high school youth indicated they had ever been told they had asthma in their lifetime. (Figure 6)

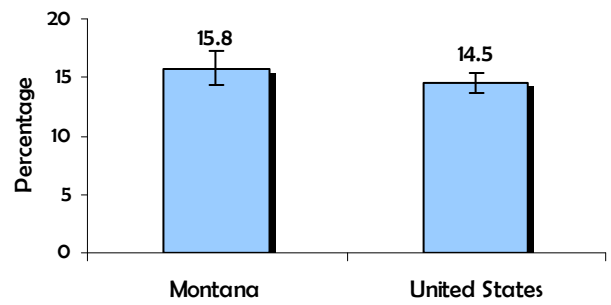
Figure 6. Self reported lifetime asthma among high school youth in Montana and the United States



Current Asthma Prevalence

In 2005, Montana high school youth reported current asthma prevalence rates that were slightly higher but not significantly different than national rates (15.8 vs. 14.5%, p=.12). (Figure 7) In the 2007 YRBS, using a different question to measure current asthma, 11.1% (95% CI 9.9-12.4) of high school youth in Montana reported currently having the disease. National YRBS data are not yet available for 2007.

Figure 7. Self reported current asthma among high school youth in Montana and the United States, 2005

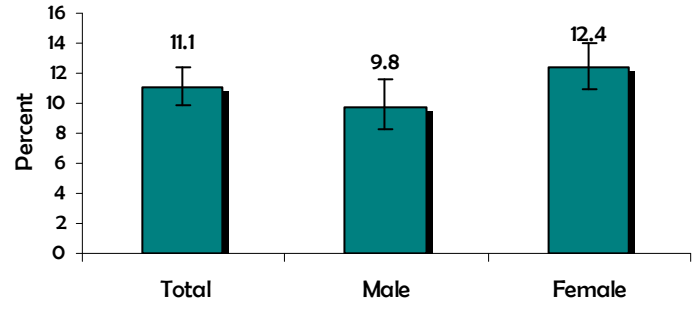


Populations at Risk

Paralleling trends from adult BRFSS data, female high school youth had higher rates of self reported current asthma in 2007 than males at 12.4% (CI 11.0-14.0) vs. 9.8% (95% CI 8.3-11.6) respectively, though the difference was not statistically significant. (Figure 8)

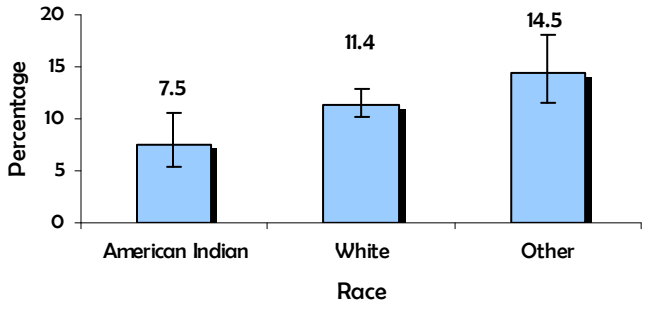
In the 2007 YRBS, American Indian high school youth reported lower rates of current asthma than their white counterparts or those of other races at 7.5% (95% CI 5.3-10.5) compared to 11.4% (95% CI 10.1-12.8) for white students and 14.5% (95% CI 11.5-18.1) for students of other races. The difference in prevalence was statistically significant for high school youth of other races compared to American Indian youth. (Figure 9)

Figure 8. Self reported current asthma among high school youth in Montana by gender, 2007



Asthma in Schools

Figure 9. Self reported current asthma among high school youth in Montana by race, 2007

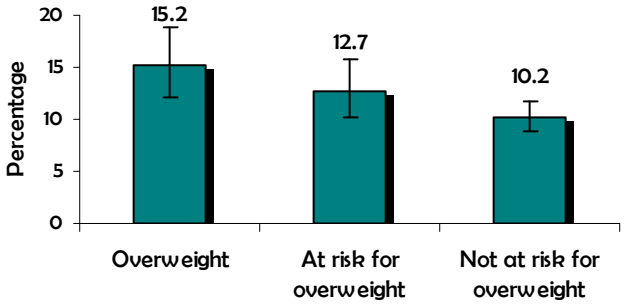


Asthma is the most prevalent chronic disease in childhood and is a leading cause of school absenteeism. With proper planning along with staff and student education, severe asthma exacerbations can be prevented and controlled in the school setting. To prepare for asthma, schools should:

- Identify students with asthma and allow them easy access to relief medication inhalers
- Encourage students with asthma and their providers to supply individualized asthma action plans to the school
- Have a school-wide policy for handling worsening asthma and educate teachers, coaches and office staff about how to assist a child during an attack
- Enforce 24 hour no smoking policies
- Reduce exposure to triggers: tobacco smoke, chemical vapors, furry or feathered animals, cockroaches, chalk dust and mold
- Keep temperature and humidity at appropriate levels
- Allow students to pre-treat to avoid exercise induced asthma

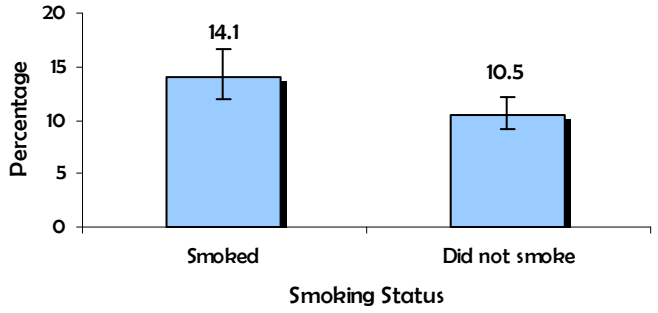
In 2007, high school students in Montana who were overweight (BMI ≥ 95th percentile) had higher rates of asthma than students who were at risk for overweight (BMI between the 85th-94th percentile) and those who were not at risk for overweight (BMI <85th percentile) at 15.2% (95% CI 12.2-18.9), 12.7% (95% CI 10.2-15.7) and 10.2% (95% CI 8.9-11.7), respectively. (Figure 10) The difference in rates was statistically significant for students who were overweight compared to those who were not at risk for overweight.

Figure 10. Self reported current asthma among high school youth in Montana according to Body Mass Index, 2007



Also of concern, high school students who reported smoking in the last 30 days had higher rates of asthma than students who did not report smoking in the past 30 days at 14.1% (95% CI 11.9-16.7) vs. 10.5% (95% CI 9.1-12.1) respectively. However, this difference was not statistically significant. (Figure 11)

Figure 11. Self reported current asthma among high school youth in Montana who smoked or did not smoke in the past 30 days, 2007



One out of every five Montana high school students has been told they have asthma in their lifetime.

Hospitalizations and Asthma

The Montana hospital discharge data set, compiled by the Montana Hospital Association (MHA) since 1990, is used to assess trends in asthma related hospitalizations in the state.

Asthma Related Hospitalizations

In 2005, there were 790 hospitalizations with a primary diagnosis of asthma among Montana residents and an additional 4229 hospitalizations with a secondary diagnosis of asthma. In all, less than one percent of hospitalizations in Montana had a primary diagnosis of asthma in 2005 while 5.8% of all hospitalized patients had either a primary or secondary diagnosis of the disease. The population rate of asthma related hospitalization (primary diagnosis) was 8.4 per 10,000 Montanans in 2005. Certain populations were at greater risk for asthma related hospitalization including:

- Females. 62% of all individuals hospitalized for asthma were female in 2005.
- Young children. In 2005, 6% of all hospitalizations in children 0-4 and 5% of hospitalizations in children 5-14 were primarily due to asthma. From 2000-2005, children 0-4 had the highest hospitalization rate of all age groups at 21.0 per 10,000. (Figure 12)
- Adults 65 and over. 27% of all asthma related hospitalizations in 2005 were among seniors.
- People living in North Central, Northeast and Southwest Montana. (See map on next page)

Figure 12. Average hospitalization rate for asthma (primary diagnosis) per 10,000 Montana residents by age, 2000-2005

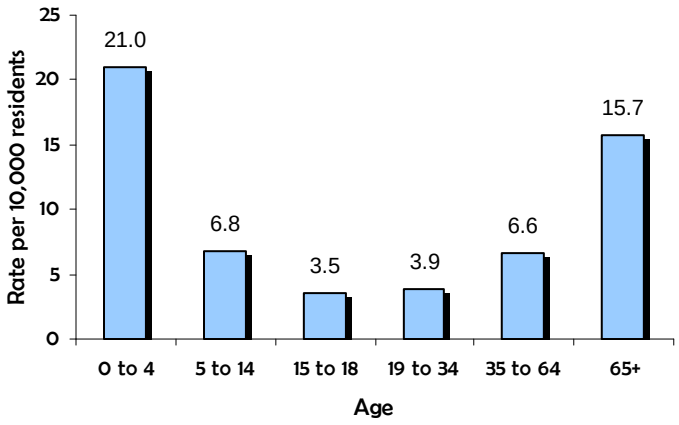
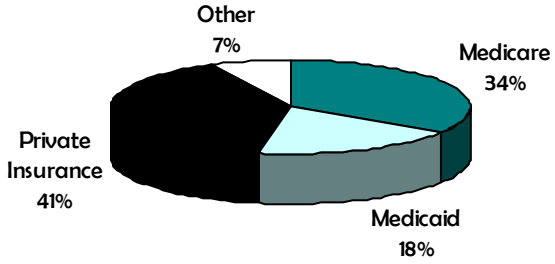


Figure 13. Primary payer for asthma hospitalizations (primary diagnosis) in Montana, 2005



The "Typical" Asthma Hospitalization in Montana

In general, hospitalizations due to asthma in Montana are:

- Transferred from an emergency department. In 2005, 62% of asthma related hospital admissions came from the ED, compared to 48% of hospital admissions for all causes.
- Paid for by Medicaid or Medicare. Half (53%) of asthma related hospitalizations were covered by Medicaid or Medicare in 2005. (Figure 13) Medicaid covered 18% of asthma related hospitalizations in Montana in 2005, while only paying for 5% of hospitalizations for all causes.
- Last 2-3 days. The mean hospital stay for a patient with a primary diagnosis of asthma from 2000-2005 in Montana was 3.1 days and the median was 2 days.
- End in a routine discharge. 93% of asthma related hospitalizations end in a routine discharge as opposed to death in the hospital or transfer to another facility.

Patients with a primary or secondary diagnosis of asthma spent over 19,000 days in Montana hospitals in 2005.

Overall Trends

From 2000 to 2005, the total number of hospitalizations with a primary diagnosis of asthma increased from 618 to 790 and the population rate increased from 6.8 to 8.4 per 10,000 Montana residents, an increase of 24%. This upward trend was mirrored in both males and females (23% and 24% increases respectively) though males had lower hospitalization rates than women overall (6.5 vs. 10.4 per 10,000 in 2005). (Figure 14)

Much of the growth in asthma hospitalization rates occurred among young children aged 0-4 and adults aged 65 and up. Hospitalizations among children aged 0-4 increased 32% from 18.5 to 24.5 per 10,000 from 2000-2005. Adults aged 65 year and older experienced a 46% increase in asthma related hospitalizations over the six year period rising from 11.6 per 10,000 in 2000 to 16.7 per 10,00 in 2005. Asthma hospitalizations for Montanans aged 5-64, already lower overall than their young and old counterparts, increased only 13% from 2000-2005.

Figure 14. Hospitalization rates for asthma (primary diagnosis) in Montana by gender, 2000-2005

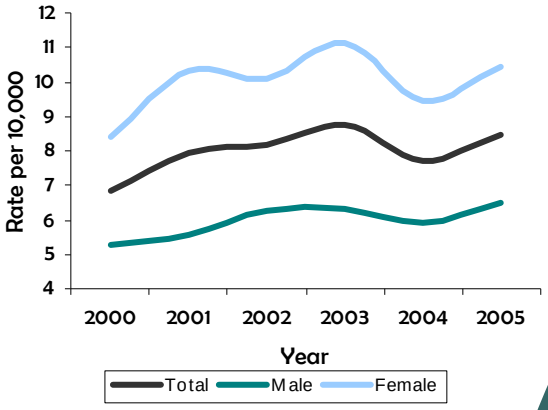
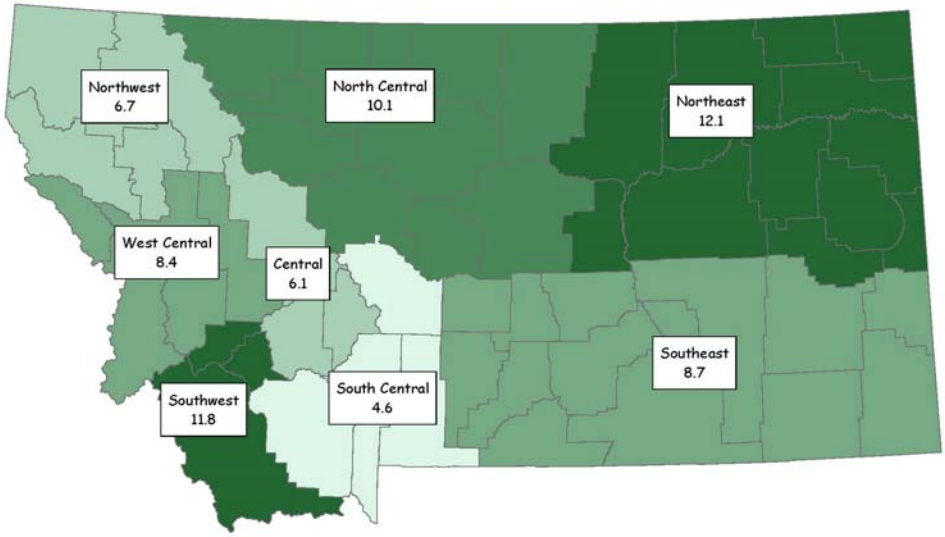


Figure 15. Rate of hospitalization with a primary diagnosis of asthma per 10,000 population by region, Montana 2005



Geographic Trends

The asthma related hospitalizations rates vary by region in Montana. The lowest rate of hospitalization is in South Central Montana (4.6 per 10,000) and the highest is in Northeast Montana (12.1 per 10,000). (Figure 15) The reason for these geographic variations is not well understood. They could be due to differences in income distribution, access to hospital and outpatient care, environmental factors, regional age distribution or physician diagnostic practices. More research is needed to elucidate the underlying cause of these regional differences in hospitalization rates.

Focus on Healthy People 2010

Objective 24-1: Reduce hospitalizations for asthma in 3 age groups

HP 2010 Objective	Montana Data 2005	Objective met?	Trend
Age < 5: 25/10,000	24.5/10,000	Yes	Up
5-64: 7.7/10,000*	6.0/10,000*	Yes	Level
65+: 11/10,000*	16.7/10,000*	No	Up

* Hospitalization rates for these age groups are age adjusted to the standard 2000 US population.

Though Montana has met the HP 2010 objectives for hospitalization for individuals aged 0-64, rates are on the rise.

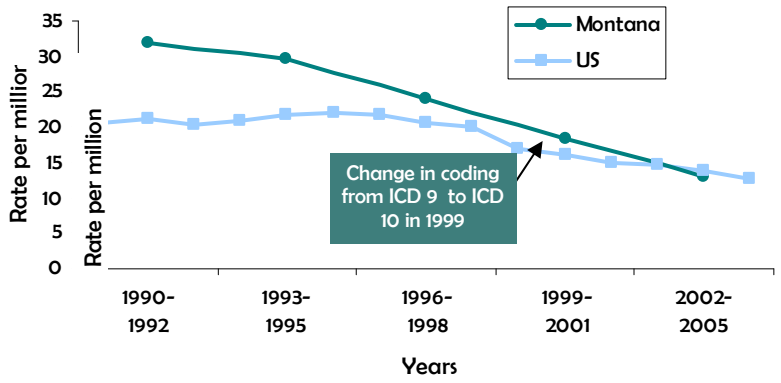
Asthma Related Deaths

Mortality data are maintained by the Montana Office of Vital Statistics and are used to analyze trends in asthma related deaths. On a death certificate, asthma can be coded as the single underlying cause of death or as one of up to twenty contributing causes of death.

Trends in Asthma Deaths

A total of 306 deaths with asthma as the underlying cause occurred in Montana from 1990-2005, for an average of 20 deaths per year. However, the total number of deaths and death rates due to asthma in Montana have steadily declined over the past 16 years. Total annual deaths dropped from a high of 28 in 1990 to a low of 10 in 2005. Overall, age adjusted asthma mortality rates declined from 32 per million Montanans in 1990-1992 to 13 per million in 2002-2005, an overall decline of 60%. The decline in asthma deaths in Montana parallels a national trend. Age adjusted asthma mortality rates in the U. S. dropped from 21 per million in 1990 to 13 per million in 2004, a decline of 38%. (Figure 16) However, 11% of the decline in both the US and Montana asthma mortality rates may be due to a change in the International Classification of Disease coding from version 9 to 10 in 1999.

Figure 17: Age adjusted asthma mortality rates for the Montana and the US, 1990-2005



Asthma Deaths by Age

Seventy-one percent of all asthma deaths in Montana from 1990-2005 occurred in adults aged 65 and older. A total of 229 older Montanans died from asthma during this time period. Another 24% of the asthma deaths occurred in adults 18-64 with the remaining 5% in children aged 0-17. (Figure 17)

Since 1990, the most significant drop in asthma death rates has occurred in adults 65 and over. Crude asthma death rates for this age group decreased from 169 per million in 1990-1992 to 79 per million in 2002-2005, a 53% decline. Total annual asthma deaths among Montana seniors dropped from a high of 20 in 1990 to a low of 11 in 2005. Recently, death rates from asthma among seniors in the state have experienced a large decline. The asthma death rate in adults aged 65 and over dropped 23% from 1999-2001 to 2002-2005 from 103 to 79 per million.

On average, 20 asthma deaths have occurred annually in Montana.

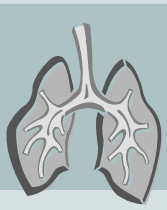
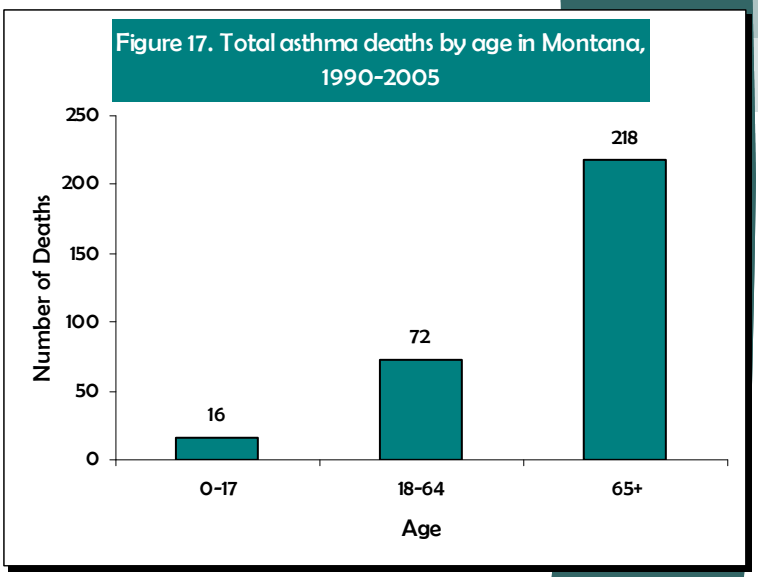


Figure 17. Total asthma deaths by age in Montana, 1990-2005



Contributing Cause Asthma Deaths

A contributing cause of death is a subsequent diagnosis associated with, but not directly causing, death. From 1993 to 2005, asthma was a contributing cause in 712 deaths in Montana, an average of 51 per year. Similar to underlying cause deaths, mortality rates for contributing cause asthma deaths are higher among females compared to males (52 per million females in 2002-2005 compared to 36 per million males in the same time period). (Figure 18) Adults aged 65 and older also have elevated contributing cause asthma death rates, 272 per million compared to 15 per million for Montanans aged 0-64 from 2002-2005.

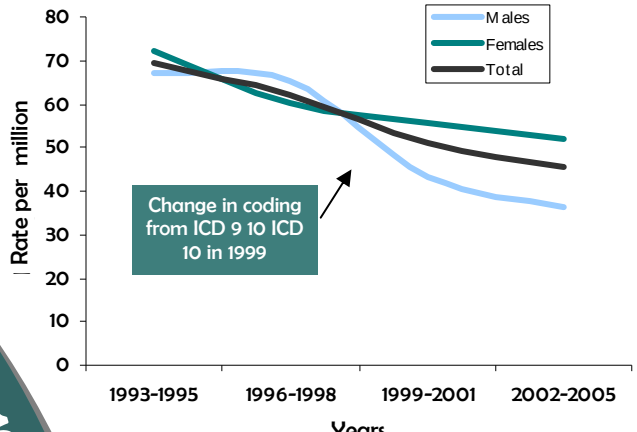
Age adjusted death rates with asthma as an contributing cause have declined 35% from 1993-1995 to 2002-2005 from 69 per million to 45 per million Montanans, however 11% of this drop is likely artificial due to the change in ICD coding in 1999. (Figure 18) Since 1999, males have experienced a more dramatic decline in contributing cause deaths than females in Montana, with a 46% drop in rates from 1993-1995 to 2002-2005 compared to only 28% among females during the same time period. (Figure 18)

Focus on Clinical Practice

Persons at risk for dying from asthma are those with severe, uncontrolled disease, a near fatal attack of asthma, and/or a history of recurrent hospitalization or intubation for asthma. Referral to an asthma specialist for consultation or co-management is recommended in the following circumstances:

- A single life-threatening asthma exacerbation.
- Treatment goals for the patient's asthma are not being met after 3 weeks to 6 months of treatment.
- Atypical signs and symptoms make asthma diagnosis unclear.
- The patient's asthma is provoked by occupational factors, an environmental inhalant, or an ingested substance.
- The initial diagnosis is severe, persistent asthma.
- The patient is a child aged < 3 years with moderate or severe persistent asthma.
- The patient is a candidate for immunotherapy.
- The patient or family requires additional education or guidance to manage asthma complications, follow the treatment plan, or avoid asthma triggers
- The patient needs continuous oral corticosteroid therapy or high-dose inhaled corticosteroids or has required more than two courses of oral corticosteroids in 1 year.

Figure 18: Age adjusted contributing cause asthma mortality rates in Montana by gender, 1993-2005



Focus on Healthy People 2010

Objective 24-1 Reduce asthma deaths in 5 age groups

HP 2010 Objective	Montana Data (2002-2005)	Objective met?	Trend
Age < 5: 1/million	-*	-	-
5-14: 1/million	-*	-	-
15-34: 2/million	3.1/million	No	Level
35-64: 9/million	7.8/million	Yes	Down
65+: 60/million	79.3/million	No	Down

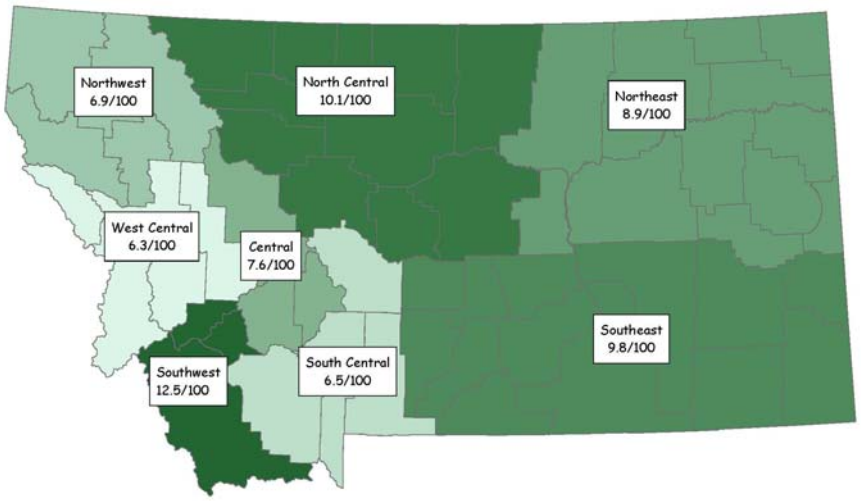
*Only 1 death in children aged 0-4 and 4 deaths in children aged 5-14 occurred in the last 16 years in Montana. No death occurred in these age groups from 2002-2005.

Montana has only met the mortality objective for ages 35-64 but death rates for asthma overall are on the decline.

Asthma in Low Income Children

This section details the asthma related healthcare utilization patterns of children aged 0-18 continuously enrolled in Montana's Medicaid program from January 2005 to December 2006. Probable asthma cases were defined as children who had at least one outpatient visit, hospitalization or emergency department visit with a primary diagnosis of asthma. In all, 2019 of the 22,870 children continuously enrolled in Medicaid during the 24 month period (8.8%) met this definition.

Figure 20. Rates of asthma by region for children continuously enrolled in Montana Medicaid from 2005-2006



Total Visits

The 2019 asthma cases in the Medicaid population had 5710 outpatient visits, 997 emergency department visits and 129 hospitalizations during the 2 year period resulting in nearly $1 million in medical costs. The overall rate of outpatient visits was 2.8 per child with asthma, and the ED and hospitalization rates were 49.4 and 6.4 per 100 children with asthma, respectively.

Populations at Risk

Boys had a higher prevalence of asthma than girls at 9.9% vs. 7.9% respectively. (OR 1.28, 95% CI 1.17-1.41) 11.4% of young children aged 0-4 had asthma, compared to 8.0% of children aged 5-18. (OR 1.47, 95%CI 1.33-1.62). In addition, American Indian children had a higher prevalence of asthma than white children or those of other races at 10.8% vs. 8.0% and 7.9% respectively. (OR 1.39 (95%CI 1.23-1.47). (Figure 19)

Geographic Differences

Asthma rates varied by region. Southwest and North Central Montana had the highest rates of asthma with 12.5 and 10.1 cases of probable asthma per 100 children enrolled in Medicaid in the region compared with West Central and South Central Montana which had the lowest rates at 6.3 and 6.5 cases of asthma per 100, respectively. (Figure 20) The reason for these geographic differences is not known. In general, areas with a larger population and higher per capita income had lower rates of asthma. However, these factors may or may not be influencing the asthma rates in the pediatric Medicaid population. More in depth analysis is needed to determine the underlying cause of these apparent disparities.

Figure 19. Prevalence of asthma among children continously enrolled in Montana Medicaid by age, gender and race, 2005-2006

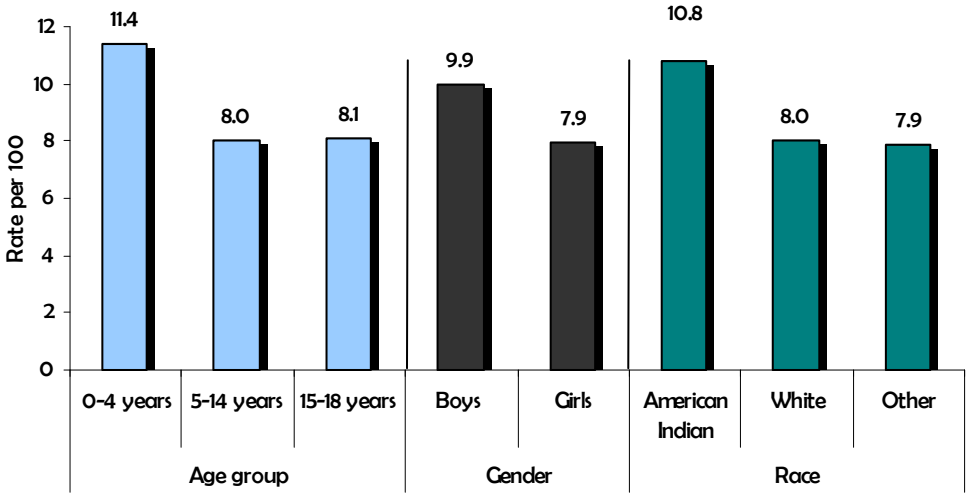
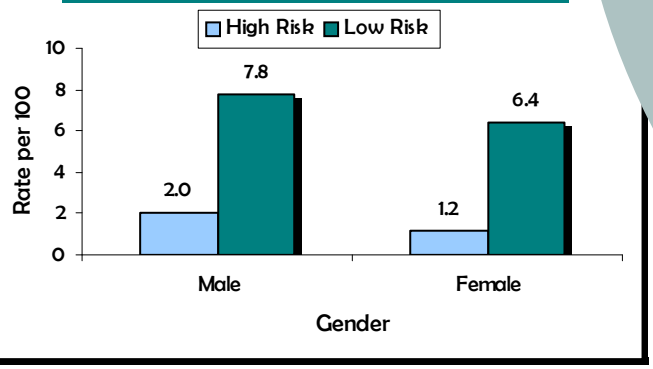


Figure 21. Prevalence of high and low risk asthma in the Montana Medicaid population by gender, 2005-2006



High vs. Low Risk Children

Children who visit the ED or have a hospital stay as a result of their asthma are at risk for severe asthma exacerbations and complications.[8] For the purpose of assessing the experience of this population, the children who had an asthma related hospitalization or ED visit in the sample were classified as high risk. In all, 18% of the sample (n=377) met this definition. Children who had only outpatient visits for asthma were classified as low risk.

Because high risk children are a target population for asthma interventions, this section examines their characteristics. In this sample, high risk children were more likely to be:

- Boys. 63% of the high risk children were male. Compared to girls, boys had significantly greater odds of being high risk. (OR 1.65 95% CI 1.33-2.04). (Figure 21)
- Young. Children aged 0-4 were more likely to be high risk than children 5-18. (OR 1.64 95% CI 1.32-2.0). (Figure 22)
- American Indian. Compared to whites, American Indians had significantly greater odds of being high risk. (OR 1.34 95% CI 1.07-1.68)
- From the north and central parts of the state. (Figure 23)

Focus on Clinical Practice

Patients who fit the following criteria should receive long-term controller therapy and, at a minimum, a low-dose inhaled corticosteroid:

Rules of Two

- Those who use a quick relief inhaler more than 2 times per week.
- Those whose symptoms wake them up at night more than 2 times per month.
- Those who refill their quick relief inhaler, receive a burst of oral corticosteroids, or have an unscheduled ED visit more than 2 times per year.

Although asthma cannot be prevented or cured, asthma attacks can be controlled. Patients with asthma should have at least two scheduled provider visits annually.

Figure 22. Prevalence of high and low risk asthma in the Montana Medicaid population by age, 2005-2006

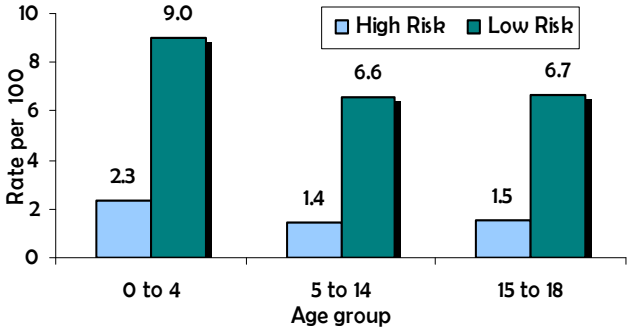
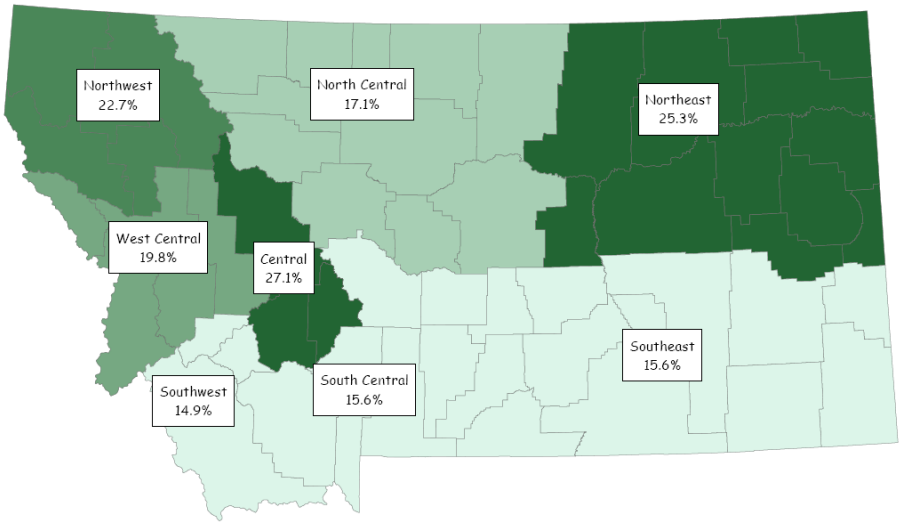


Figure 23. Percent of children with asthma who were classified as high risk of those continuously enrolled in Montana Medicaid from 2005-2006, by region



Multiple ED Visits

Studies indicate that children who frequent the ED for asthma related care have fewer outpatient visits than other children with asthma and may follow suboptimal medication regimens, using mainly rescue rather than preventive medication.[8,9] Of the 2019 children with probable asthma in Montana, 347 (17%) had an asthma related ED visit during the 2 year period. Of this group, the majority were repeat visitors; 290 (89%) had 2 or more ED visits. Because children with multiple ED visits place a high burden on the healthcare system and are key targets for intervention, this section details their characteristics.

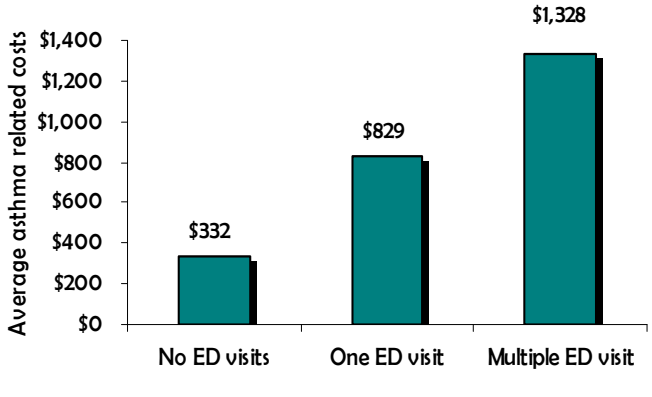
Children with 2 or more ED visits made up:

- 14% of the total population with asthma (290/2019)
- 25% of all outpatient visits (1424/5710)
- 64% of all hospitalizations (82/129)
- 39% of all asthma related costs ($385,000/ $989,000)

Medication patterns from 2005-2006:*

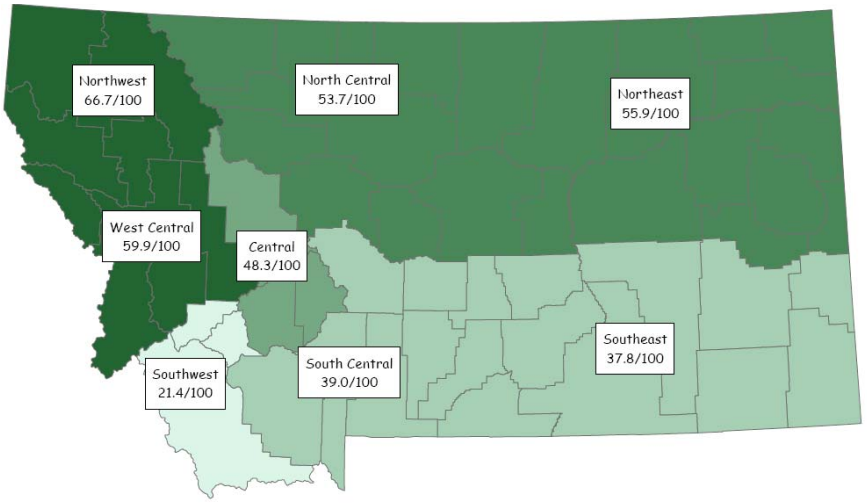
- 6% of the children with multiple ED visits had no medications for asthma filled
- 27% did not have a preventive asthma prescription filled
- Children with 2 or more ED visits averaged 6.5 quick relief prescriptions per child during the 2 year period compared to 3.6 among children with no ED visits.
- Preventive medications made up 60% of the total asthma medications filled for children with no ED visits compared to 53% for children with multiple ED visits.

Figure 24. Average cost of asthma related care for children with probable asthma continously enrolled in Montana Medicaid, 2005-2006



*Indian Health Service pharmacies do not systematically bill Medicaid for asthma prescriptions filled for Medicaid patients, so American Indian children were excluded from the prescription analysis.

Figure 25. Rate of ED visits per 100 children with probable asthma continuously enrolled in Montana Medicaid from by region, 2005-2006



In contrast to findings from in previous studies,[9] children with multiple ED visits in this sample had more outpatient visits for asthma than children who did not visit the ED, an average of 4.9 vs. 2.4 asthma related outpatient visits per child.

Children with multiple ED visits exact a high financial burden on the Medicaid system, averaging $1,000 more in asthma related costs during the two year period compared to the children with no ED visits and $500 more than children who only visited the ED once. (Figure 24)

Geographic Differences: ED and Outpatient Visits

The rate of emergency department visits varied by region. (Figure 25) In all, there were 997 total ED visits among the 2019 children for a rate of 49.4 ED visits per 100 children with asthma. However the rate of ED visits was highest in the northern part of the state with a high of 66.7 ED visits per 100 children with asthma in the Northwest region. Southern regions had the lowest ED utilization rates, with the Southwest, South Central and Southeast regions all with rates of less than 40 per 100. Interestingly, the Southwest region had the lowest rate of ED utilization in the state (21.5 ED visits per 100 children with asthma) despite having the highest rate of probable asthma among the pediatric Medicaid population overall (12.5%). (Figure 20)

Only 33% of children with asthma on Medicaid received an influenza vaccine in 2005 or 2006 and only 56% had a routine medical exam.

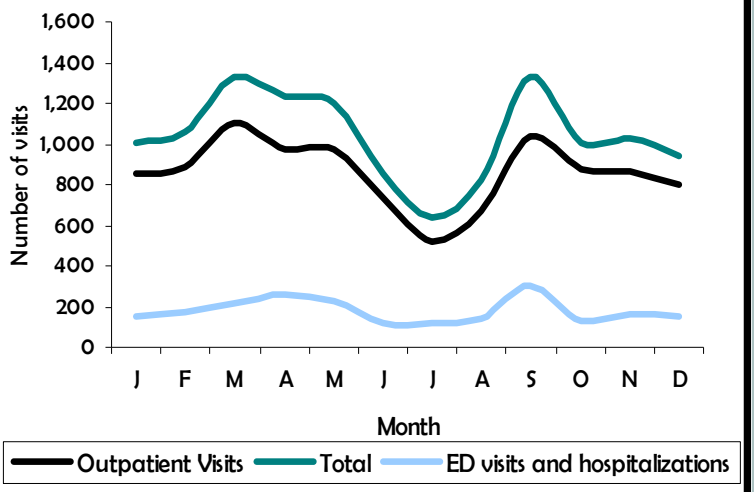
Regional rates of outpatient utilization for asthma differ from ED utilization patterns in the Montana pediatric Medicaid population. It is important to track these differences because children should ideally receive their asthma related health care in an outpatient setting rather than the emergency room. With the exception of the South Central region, the southern part of the state had the highest rates of outpatient visits per child with probable asthma. The Southwest region, which had the lowest rate of ED utilization, had the highest rate of outpatient visits, at 3.6 per child with probable asthma. Areas with lower rates of outpatient visits included the South Central, Northeast, North Central, North West and West Central areas, all with rates of less than 3 outpatient visits per child with asthma. (Figure 26)

Another way to examine outpatient healthcare is to look at the number of routine visits recorded for children with asthma on Medicaid. The rates of routine physical exam were low in this sample. Only 56% of the children on Medicaid with asthma had a routine medical exam from 2005-2006.

Visits by Month

Children on Montana Medicaid accessed asthma related healthcare more frequently in September, demonstrating what some researchers refer to as the "September epidemic." [10] This spike in asthma related medical visits coincides with the first few weeks of school and is likely due to increased exposure to rhinovirus in the school setting. Asthma related medical visits were also higher in the late winter and early spring (March-May) and were lowest during the summer months. Seasonal variations in asthma related healthcare utilization were substantial with a 108% increase from July to September. (Figure 27)

Figure 27. Hospitalizations, ED and Outpatient visits with a primary diagnosis of asthma for children enrolled in the Montana Medicaid program from 2005-2006, by month



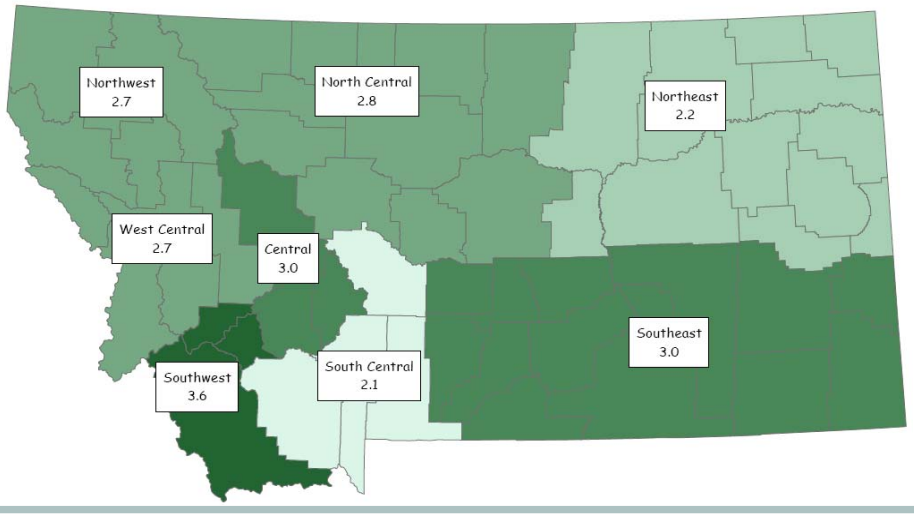
Related Diagnoses

Many medical conditions can contribute to and exacerbate asthma including allergies, pneumonia, bronchiolitis, bronchitis and influenza.

Of the children with probable asthma:

- Only 33% received an influenza vaccine during the 2 year period, despite CDC recommendations that all children with asthma be vaccinated yearly.
- 19% had a related allergy diagnosis.
- 9% had a diagnosis of pneumonia, including 13% of the children aged 0-4.
- 37% of 0-4 year olds had a bronchiolitis diagnosis. Of the 0-4 year olds who visited the hospital or emergency room, 42% had bronchiolitis during the study period.
- 22% had a bronchitis diagnosis. This diagnosis was most common among younger children aged 0-4 (27%).

Figure 26. Rate of outpatient visits for children with probable asthma continuously enrolled in Montana Medicaid from 2005-2006, by region



Conclusion

This report is the first attempt to compile existing data related to asthma in Montana. Data on adult and youth prevalence, hospitalizations, deaths, and Medicaid utilization in children indicate that asthma is a prevalent chronic disease affecting thousands of individuals in Montana. Eight percent of adults and 11% of high school youth report that they currently have asthma and almost 9% of children enrolled in Medicaid in Montana are receiving asthma related health care. The disease causes over 700 hospitalizations and an average of 20 deaths each year, the majority of which could be prevented through proper asthma management and control.

These findings highlight the urgent need for public health interventions to address asthma in Montana. The Asthma Control Program in the Department of Public Health and Human Services is committed to strengthening asthma control efforts in Montana in the following ways:

Developing Surveillance

The current surveillance system in the state does not answer many important questions regarding asthma in Montana. To improve the current system, surveillance should be developed for:

- Asthma related ED visits
- Adherence to clinical guidelines
- Asthma self management
- Undiagnosed asthma symptoms
- School/work days missed due to asthma

Focus on Healthy People 2010

Montana does not currently measure five Healthy People 2010 asthma objectives

Unmeasured HP 2010 Asthma Objectives
24-3 Reduce hospital ED visits for asthma
24-4 Reduce activity limitations due to asthma
24-5 Reduce number of school or work days missed by persons with asthma due to asthma
24-6 Increase proportion of persons with asthma who receive formal patient education
24-7 Increase proportion of persons who receive appropriate care according to National Asthma Education and Prevention Program guidelines

Several projects are already underway to develop asthma surveillance. The Asthma Control Program is working with other programs in the Chronic Disease Bureau to recruit hospitals in Montana to participate in an ED reporting pilot project. This project will allow hospitals to provide de-identified emergency department data to state public health officials.

In addition, Montana began participating in the Asthma Call-Back Survey in 2006 sponsored by the CDC. In this survey, respondents who indicate that they currently have asthma on the state BRFSS are contacted again and asked more in-depth questions about asthma related healthcare utilization, disease management, medication use, symptoms, and attack prevalence. Once these data are available, they will provide a better picture of the needs and challenges that individuals with asthma face. These data will allow monitoring of the Healthy People 2010 objectives related to activity limitations, missed days of school and work, disease management education and appropriate asthma care.

Convening Stakeholders

The Asthma Control Program has recruited a group of 30 key stakeholders from across the state to act as an advisory body for the program. The first meeting of the Asthma Control Workgroup was in February 2008.

Developing a Comprehensive Asthma Control Plan

The Asthma Control Program is committed to working with key stakeholders across Montana to develop a comprehensive asthma control plan. This plan will focus on evidence based interventions to be implemented in variety of settings statewide including schools, hospitals, daycare facilities, and occupational sites. A comprehensive asthma control plan will focus attention on public health solutions by promoting individual, family and provider education, reduction of environmental triggers, the promotion of indoor and outdoor air quality and the development of asthma related policy.

For more information about Montana's Asthma Control Program contact Katie Loveland, Program Manager at kloveland@mt.gov.

Methods and Data Limitations

There are several limitations commonly associated with asthma survey data. First, there is no definitive laboratory test for asthma and differentiating asthma from other obstructive pulmonary diseases is challenging. Self-reported asthma estimates rely on provider accuracy when diagnosing asthma, conveying the diagnosis to the patient and patient recall of the diagnosis. Estimates that rely on medical and death records are contingent on an accurate diagnosis of asthma and proper documentation of asthma related events in patient records.

The data used in this report were analyzed using SPSS v16.0 and Microsoft Excel 2003 software.

BRFSS

The Behavioral Risk Factor Surveillance System (BRFSS) is a telephone survey of a random sample of non-institutionalized adults conducted across the US. The Montana BRFSS is a partnership between the Montana DPHHS and the CDC. In 2006, over 6,000 Montana adults aged 18 and up answered questions regarding various health conditions and risk factors, including asthma.[3] BRFSS data were used to estimate the population prevalence of asthma for adults. Our analysis used BRFSS data from 2001- 2006. The BRFSS contains two core questions regarding asthma.

Lifetime asthma prevalence

- "Have you ever been told by a doctor, nurse or other health professional that you had asthma?

Current asthma prevalence

- "Do you still have asthma?"

Only respondents who answer "yes" to the lifetime asthma prevalence question are asked about current asthma.

BRFSS data have several limitations. Data are self-reported so responses may be inaccurate due to individual interpretation and recall of the an asthma diagnosis. Because the lifetime asthma question is contingent on a health professional's diagnosis of the disease, persons with barriers to healthcare access may underreport lifetime asthma.

In addition, this survey excludes households without telephones which may bias the results for certain segments of the population. An estimated 3% of Montana households do not have a residential telephone.[11] Persons in these households may have higher prevalence of asthma than persons in households that do have telephones because of socioeconomic circumstances.

YRBS

The Youth Risk Behavior Survey (YRBS) has been administered every two years across the US since 1991. The Montana YRBS is a partnership between the CDC's Division of Adolescent and School Health and the Montana Office of Public Instruction. The YRBS is used to monitor health risk behaviors in young adults and includes questions about tobacco, alcohol and drug use as well as dietary and physical activity patterns. Since 2005, the YRBS has also measured lifetime and current asthma.

The most recent YRBS in Montana was administered in February 2007 to 4030 students at 50 randomly selected high schools across the state.[12] The data presented in our analysis were weighted to represent the entire population of Montana students in grades 9-12.

The YRBS questionnaire contains two core questions regarding asthma. The wording of the current asthma question was altered in 2007.

Lifetime asthma prevalence

- "Has a doctor or nurse ever told you that you have asthma?

Current asthma prevalence

- "During the past 12 months have you had an episode of asthma or an asthma attack?" (2005)
- "Do you still have asthma?" (2007)

Like the BRFSS, the YRBS has limitations related to self report. Similar to the BRFSS, reporting of lifetime asthma prevalence may vary based on students' access to health care. There is evidence that rural American Indian and Alaska Native youth may report lower rates of physician diagnosed asthma, despite the presence of asthma symptoms.[13] Since the current asthma question was changed between 2005 and 2007, the rates of current asthma for the two years are not comparable.

Montana hospital discharge data

For this analysis, hospital discharge data from 2000 to 2005 were analyzed. Primary and secondary diagnoses of asthma were identified using International Classification of Diseases, Ninth Revision (ICD-9) codes 493.00-493.99. Data for Montana residents hospitalized in other states were not available and data for non-Montana residents hospitalized within the state were excluded. The Montana hospital discharge data set is maintained by the Montana Hospital Association (MHA). Population estimates used to calculate hospitalization rates were taken from the National Center for Health Statistics bridged population estimates from 2000 to 2005. National age adjusted mortality rates were obtained through CDC WONDER.[14]

Methods and Data Limitations Continued

Montana hospital discharge data cont.

There are a number of limitations associated with hospital discharge data. Reporting for the MHA discharge data includes 65% of acute care inpatient hospitals in Montana. Of these hospitals, over 70% report 90% or more of their discharges. Veterans Administrators, Indian Health Service and state hospitals, as well as a handful of small private hospitals, do not participate in MHA's hospital discharge reporting system. Thus, the hospitalization rates for asthma are likely underestimated based on the incompleteness of the data set.

Mortality

Death record information in Montana is collected by the Office of Vital Statistics (OVS) in the DPHHS. This analysis includes deaths from 1990 to 2005. Population estimates used to calculate age adjusted death rates were taken from the National Center for Health Statistics bridged population estimates from 1990 to 2005.

Each death certificate issued in Montana lists one underlying cause and up to 20 contributing causes of death. For this analysis, a death was classified as having asthma as an contributing cause if an ICD 9 or 10 code was listed in any of the 20 contributing cause fields. Contributing cause data for deaths in Montana are available from 1993 to 2005. The ICD 9 codes used to identify asthma deaths prior to 1999 were 493.00-493.99. From 1999 onward, asthma deaths were identified as those listed with ICD-10 codes J45 or J46. The change in coding in 1999, when the Montana OVS began reporting deaths in Montana using ICD 10 instead of the ICD 9 codes, affected the number of asthma deaths reported in the state. The CDC estimates that the change in ICD coding caused the national asthma death rates to drop 11%.[15] Thus, a portion of the decline in asthma death rates is likely artificial due to this change.

Medicaid

The Montana Medicaid Program maintains the Medicaid Management Information System (MMIS) for the state. For the purposes of this report, we queried the MMIS to locate all of the records of children 0-18 continuously enrolled in the Medicaid program from January 2005-December 2006 with an outpatient visit, hospitalization or ED visit with a primary diagnosis of asthma. Special thanks to Medicaid analyst Eric Higginbotham for performing this query. Specific information about each probable asthma case was provided to the Asthma Control Program for analysis including the total number of asthma related medical visits during the time period, the number of quick relief and preventive asthma medications filled, medical cost data and demographic information like county of residence, gender, race and age. In addition, the total number of children continuously enrolled in Medicaid from 2005-2006 by race, gender and county of origin was provided to calculate rates of probable asthma. Odds ratios were calculated using Epi Info v3.4.3.

Several imitations for this analysis exist. First, our definition of probable asthma in this report is one of many used in the literature. Other studies define probable asthma more broadly (use of any asthma related medication) or more narrowly (at least one outpatient visit for asthma plus four medication dispensing events annually).[16] In addition, some definitions classify asthma cases based on severity (intermittent vs. persistent).[17] Because there is such wide variation in the definition of asthma cases, caution should be used when comparing the asthma rates in this report to those in other studies. Additionally, American Indian children were excluded from the medication analysis because the Indian Health Service does not systematically bill Medicaid for asthma medications for Medicaid enrolled American Indian children.

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- Unnamed Peak and Haystack Butte

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